

# PATENT COOPERATION TREATY

## PCT

### INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY (Chapter I of the Patent Cooperation Treaty)

(PCT Rule 44bis)

Applicant's or agent's file reference 16-596	<b>FOR FURTHER ACTION</b>		See item 4 below
International application No. PCT/JP2005/003127	International filing date ( <i>day/month/year</i> ) 25 February 2005 (25.02.2005)	Priority date ( <i>day/month/year</i> ) 09 March 2004 (09.03.2004)	
International Patent Classification (8th edition unless older edition indicated) See relevant information in Form PCT/ISA/237			
Applicant KEIHIN CORPORATION			

1. This international preliminary report on patentability (Chapter I) is issued by the International Bureau on behalf of the International Searching Authority under Rule 44 bis.1(a).

2. This REPORT consists of a total of 7 sheets, including this cover sheet.

In the attached sheets, any reference to the written opinion of the International Searching Authority should be read as a reference to the international preliminary report on patentability (Chapter I) instead.

3. This report contains indications relating to the following items:

- |                                     |              |                                                                                                                                                                 |
|-------------------------------------|--------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <input checked="" type="checkbox"/> | Box No. I    | Basis of the report                                                                                                                                             |
| <input type="checkbox"/>            | Box No. II   | Priority                                                                                                                                                        |
| <input type="checkbox"/>            | Box No. III  | Non-establishment of opinion with regard to novelty, inventive step and industrial applicability                                                                |
| <input type="checkbox"/>            | Box No. IV   | Lack of unity of invention                                                                                                                                      |
| <input checked="" type="checkbox"/> | Box No. V    | Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement |
| <input checked="" type="checkbox"/> | Box No. VI   | Certain documents cited                                                                                                                                         |
| <input type="checkbox"/>            | Box No. VII  | Certain defects in the international application                                                                                                                |
| <input type="checkbox"/>            | Box No. VIII | Certain observations on the international application                                                                                                           |

4. The International Bureau will communicate this report to designated Offices in accordance with Rules 44bis.3(c) and 93bis.1 but not, except where the applicant makes an express request under Article 23(2), before the expiration of 30 months from the priority date (Rule 44bis .2).

The International Bureau of WIPO 34, chemin des Colombettes 1211 Geneva 20, Switzerland		Date of issuance of this report 29 November 2006 (29.11.2006)
Facsimile No. +41 22 338 82 70		Authorized officer  Yoshiko Kuwahara e-mail: pt07@wipo.int

# PATENT COOPERATION TREATY

TRANSLATION

From the  
INTERNATIONAL SEARCHING AUTHORITY

PCT

WRITTEN OPINION OF THE  
INTERNATIONAL SEARCHING AUTHORITY

(PCT Rule 43bis.1)

To:

Date of mailing  
(day/month/year)

Applicant's or agent's file reference

**16-596**

**FOR FURTHER ACTION**

See paragraph 2 below

International application No.

**PCT/JP2005/003127**

International filing date (day/month/year)

**25.02.2005**

Priority date (day/month/year)

**09.03.2004**

International Patent Classification (IPC) or both national classification and IPC

Applicant

**KEIHIN CORPORATION**

1. This opinion contains indications relating to the following items:

- ☒ Box No. I Basis of the opinion
- ☐ Box No. II Priority
- ☐ Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- ☐ Box No. IV Lack of unity of invention
- ☒ Box No. V Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- ☒ Box No. VI Certain documents cited
- ☐ Box No. VII Certain defects in the international application
- ☐ Box No. VIII Certain observations on the international application

2. **FURTHER ACTION**

If a demand for international preliminary examination is made, this opinion will be considered to be a written opinion of the International Preliminary Examining Authority ("IPEA") except that this does not apply where the applicant chooses an Authority other than this one to be the IPEA and the chosen IPEA has notified the International Bureau under Rule 66.1bis(b) that written opinions of this International Searching Authority will not be so considered.

If this opinion is, as provided above, considered to be a written opinion of the IPEA, the applicant is invited to submit to the IPEA a written reply together, where appropriate, with amendments, before the expiration of 3 months from the date of mailing of Form PCT/ISA/220 or before the expiration of 22 months from the priority date, whichever expires later.

For further options, see Form PCT/ISA/220.

3. For further details, see notes to Form PCT/ISA/220.

Name and mailing address of the ISA/JP

Authorized officer

Facsimile No.

Telephone No.

WRITTEN OPINION OF THE  
INTERNATIONAL SEARCHING AUTHORITY

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Box No. I

Basis of this opinion

1. With regard to the language, this opinion has been established on the basis of the international application in the language in which it was filed, unless otherwise indicated under this item.

☐

This opinion has been established on the basis of a translation from the original language into the following language

\_\_\_\_\_, which is the language of a translation furnished for the purposes of international search (under Rule 12.3 and 23.1(b)).

2. With regard to any nucleotide and/or amino acid sequence disclosed in the international application and necessary to the claimed invention, this opinion has been established on the basis of:

a. type of material

☐

a sequence listing

☐

table(s) related to the sequence listing

b. format of material

☐

in written format

☐

in computer readable form

c. time of filing/furnishing

☐

contained in the international application as filed.

☐

filed together with the international application in computer readable form.

☐

furnished subsequently to this Authority for the purposes of search.

3. ☐ In addition, in the case that more than one version or copy of a sequence listing and/or table(s) relating thereto has been filed or furnished, the required statements that the information in the subsequent or additional copies is identical to that in the application as filed or does not go beyond the application as filed, as appropriate, were furnished.

4. Additional comments:

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Box No. V Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Claims	1-5	YES
	Claims		NO
Inventive step (IS)	Claims	4	YES
	Claims	1-3, 5	NO
Industrial applicability (IA)	Claims	1-5	YES
	Claims		NO

2. Citations and explanations:

The subject matter of claim 1 does not appear to involve an inventive step in view of document 1 (microfilm of the specification and drawings annexed to the application of Japanese Utility Model Application No. 181606/1983 (Laid-open No. 88070/1985) (Nippondenso Co., Ltd., presently named Denso Corp.)) and document 2 (JP, 60-49175, A (Nissan Motor Co., Ltd.)) cited in the ISR.

Document 1 describes an electromagnetic fuel injection valve having the same constitution as the conventional electromagnetic fuel injection valve described in claim 1.

Furthermore, as clearly shown in Figs. 1 and 4 of document 1, a first journal part near the valve seat of the electromagnetic fuel injection valve of the invention described in document 1 is formed from a sliding surface allowed to come into slidable contact with the inner surface of the guide hole and a pair of tapered sloping surfaces arranged continuously with both longitudinal sides of the sliding surface.

Incidentally, the invention of claim 1 has the effect that "although the contact part of the movable core side sloping surface and sliding surface comes into easy contact with the inner surface of the guide hole in response to the inclination of the valve assembly, the initial adaptability with the inner surface of the guide hole is improved such that the wear amount can be reduced by avoiding at least the contact part of the movable core side sloping surface and sliding surface forming an acute angle", due to the constitution in which "the sloping surface consists of a first sloping surface portion arranged continuously with the end part of the sliding surface extending along the axis of a valve stem part and a second sloping surface portion arranged continuously with the first sloping surface portion". This matter is neither described nor suggested in document 1.

On the other hand, document 2 (page 2, lower-right column, lines 7-17 and Fig. 2) describes the problem that the outer circumference of a plunger of a flow controlling valve is worn down if the plunger is slid repeatedly in the sliding hole in the condition where the plunger is inclined. Furthermore, document 2 (page 3, upper-left column, lines 14-20 and Fig. 5) also describes a constitution for solving this problem, in which chamfering parts are provided at the end of the outer circumference of the plunger along the entire circumference, and in which round parts are provided at the border between the chamfering part and the sliding part along the entire circumference.

Incidentally, the invention described in document 2 relates to a technique of an electromagnetic valve comprising a valve body absorbed to a core by energization of a coil, as in the invention described in document 1 above.

In addition, it is recognized that controlling the wear caused by sliding is a well-known matter, which is not limited to the above-mentioned technical area.

Therefore, although the "guiding part 37" in the invention described in document 1 already has a sloping part, a person skilled in the art could have easily conceived of adopting the idea of providing chamfering parts at the end of the outer circumference of a plunger along the entire

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Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability;  
citations and explanations supporting such statement

circumference as in the invention described in document 2 to provide another sloping surface in addition to said sloping surface such that the angle formed by a plane positioned orthogonal to the axis of a valve stem part and this surface is larger than the angle of said sloping surface, so as to achieve a constitution consisting of a first sloping surface portion arranged continuously with the end part of the sliding surface extending along the axis of the valve stem part, and a second sloping surface portion arranged continuously with the first sloping surface portion as in the invention of claim 1.

In addition, document 3 (JP, 2003-227436, A (Hitachi, Ltd.)) describes an invention of adopting a spherically-shaped sliding surface of a valve body in order to prevent a guiding surface from being rubbed by the corner of the sliding surface of the valve body due to the fact that the valve body is inclined.

It is understood that adopting a spherically-shaped sliding surface of a valve body is adopting a polygonal shape comprising an infinite number of corners for the sliding surface.

Therefore, a person skilled in the art could have easily conceived of providing another sloping surface in addition to the sloping surface of the valve body taking the constitution of the invention described in document 3, in which the sliding surface of the valve body is spherically-shaped, into consideration, so as to achieve a constitution consisting of a first sloping surface portion arranged continuously with the end part of the sliding surface extending along the axis of a valve stem part and a second sloping surface portion arranged continuously with the first sloping surface portion as in the invention of claim 1.

The subject matter of claim 2 does not appear to involve an inventive step in view of documents 1-3.

The limitation of numerical range in the invention of claim 2 is considered to be mere matter of design a person skilled in the art can determine as required on the basis of experimental results or restrictions arising from the specific design.

The subject matter of claim 3 does not appear to involve an inventive step in view of documents 1-3.

The "lower sliding surface 9" in the invention described in document 3 slides against the "lower guiding surface 10" near the "valve seat 13" and has a function of making the "valve body 4" travel back and forth by sliding. Therefore, this "lower sliding surface 9" corresponds to the "first journal part 21" in the invention of claim 3.

Furthermore, the "spherically-shaped spherical valve 12" is seated on the "valve seat 13" and has a function of sealing the fuel by being seated. Therefore, the "spherically-shaped spherical valve 12" corresponds to the semispherical "valve part 19a" in the invention of claim 3.

In addition, it is clear from Fig. 2 of document 3 that the "lower sliding surface 9" in the invention described in document 3 coincides with the surface passing through the center of the spherical surface of the "spherical valve 12" orthogonally to the axis of the "valve body 4".

Therefore, it is recognized that document 3 describes a characteristic feature of the electromagnetic fuel injection valve described in claim 3.

Therefore, a person skilled in the art could have easily conceived of applying the above constitution of the invention described in document 3 belonging to the same technical area of an electromagnetic fuel injection valve, to the invention described in document 1 to achieve the constitution of the invention of claim 3.

The subject matter of claim 5 does not appear to involve an inventive step in view of documents 1-3.

The electromagnetic fuel injection valve in the invention described in document 1 has a constitution in which "chamfering parts 39a to 39d" for allowing the flow of the fuel are provided at

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citations and explanations supporting such statement

a plurality of positions in the circumferential direction of the "guiding part 37" having a larger diameter than the seal diameter of a "valve seat 33" seated by a "needle valve 31", and in which a fuel path is provided on the "needle valve 31" wherein the fuel path comprises a "fuel path 31a" extending along the axis of the "needle valve 31" capable of opening the back-end while opening the front-end, and an "open hole part 36" connecting to the "fuel path 31a" astern of the "guiding part 37".

Incidentally, in the invention of claim 5, the diameter of the valve stem part is configured to be smaller than the seal diameter of the valve seat seated by the valve body. So, this matter is different from the constitution of the invention of document 1 because this matter is neither described nor suggested in document 1.

However, since this matter is considered to be a concept of minimizing the diameter of the valve stem part regardless of the dimension of the seal diameter, and reduction in size and weight of an element is a well-known problem which is not restricted to this technical area, the difference above is considered to be mere matter of design.

Therefore, a person skilled in the art could have easily conceived of applying the invention described in document 3 to the invention described in document 1 to achieve the invention of claim 5.

The subject matter of claim 4 is neither described in any of the documents cited in the ISR nor obvious to a person skilled in the art.

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Box No. VI Certain documents cited

1. Certain published documents (Rule 43bis.1 and 70.10)

Application No. Patent No.	Publication date (day/month/year)	Filing date (day/month/year)	Priority date (valid claim) (day/month/year)
JP 2004-278464 A [P, Y]	07.10.2004	18.03.2003	

2. Non-written disclosures (Rule 43bis.1 and 70.9)

Kind of non-written disclosure	Date of non-written disclosure (day/month/year)	Date of written disclosure referring to non-written disclosure (day/month/year)
--------------------------------	----------------------------------------------------	---------------------------------------------------------------------------------------